Name and brief description of initiative:
NIH Gene and Environment Initiative

Brief description of goals of initiative:
The overall goal of the Gene and Environment Initiative (GEI) is to understand disease etiology by focusing on the genetic and environmental causes of complex human disease. To accomplish this, the GEI is establishing a program to develop improved measures of environmental exposures, diet and physical activity and their effects on human health. Critical to this effort are technologies for improved individual exposure assessment and research into the genomic, proteomic, and metabolomic scale response to these factors. Coupled with this effort will be an assessment of the genetic determination of individual susceptibility to environmental factors. This effort will revolutionize the practice of medicine by allowing us to predict disease, develop more precise therapies and, ultimately, pre-empt the development of disease in the first place.

Principal investigator: No awards have been made as of this time

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Brief description of biomedical informatics and computational biology components and their goals:
The GEI will be heavily reliant on informatics and computational biology for three critical aspects: Data handling, Data integration, and Data dissemination. This initiative will be generating extensive data sets on individual and cross-species biological responses to environmental exposures, dietary factors and physical activity, and psychosocial stressors that can lead to human disease. Considerable amounts of data will need to be acquired and managed in a computing environment that ensures individual privacy. This data will span many scales of organization from exposure to genetic sequence, genomic, proteomic and metabolomics response and ultimately phenotypic endpoint. Computational tools will be needed for the integration and analysis of this data. Finally, the GEI will ultimately be a public resource for information on the identification of biomarkers of exposure and response; therefore, it is critical that the results be presented in a publicly accessible and comprehensive format.

Brief description of resources and tools available for sharing:
The GEI will be a data-rich research enterprise. The primary deliverable will be biomedical knowledge on how environmental, dietary and psychosocial factors impact common biologic and pathogenic mechanisms of disease and the interaction between genetic and environmental factors that play a role in the disease process; to that end, GEI will be focused on developing and sharing an extensive array of data to improve human exposure assessment.

Brief description of integrative efforts:

Standard ontologies/terminologies: The development of ontologies is not an inherent focus of the GEI; however, as noted above one of the major aspects of this effort is the integration of data across multiple species and levels of biologic complexity. The availability of ontologies that define computable relationships between entities is, therefore, essential.

Interactions with other initiatives: The GEI includes two critical components, the Exposure Biology Program and the Whole Genome Association (WGA) Studies. The WGAs, lead by NHGRI as a complementary trans-NIH program, are focused on uncovering the genetic variants associated with a variety of common human diseases. To the extent feasible, the GEI programs will build on and leverage other major NIH and extramural initiatives and existing population based studies.

Opportunities for collaboration or synergy with the NCBCs: Collaboration with the NCBCs could provide GEI with the tools needed to meet each of its informatics needs. This is particularly true in the area of data integration and analysis where the development of ontologies and modeling resources will be critical to the initiatives success.

Prepared by D. Balshaw, 6/23/2006